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## Building Digital Technology Capacity to Support Data Education in Edinburgh and South East Scotland Region Schools

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## Summary and Recommendations



### **Building Digital Technology Capacity to Support Data Education in Edinburgh and South East Scotland Region Schools**

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## 1 Context and Purpose of Report

The aim of Data Education in Schools programme, funded by the Data Driven Innovation Skills Gateway in the Edinburgh and South East Scotland City Region Deal, is to develop skills in data literacy for learners and teachers. **The purpose of this report is to recommend the appropriate digital technology infrastructure which is required to support the data education curriculum.**

The world of employment is predicted to change significantly in the future. It is anticipated that the need for some skills will disappear and the demand for other new skills and abilities will increase. As the use of automation and integrated technologies increases across all professional areas and working patterns shift, the skills profiles of different occupations are also likely to change.

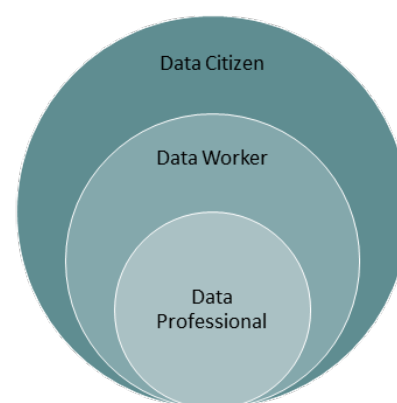
Data will play an increasingly significant role in all aspects of our personal and professional lives. Ensuring that everyone has the awareness, skills and the critical data literacies needed to navigate its uses and affordances successfully is increasingly important.

Edinburgh has the ambition to become the Data Capital of Europe and is well-positioned to become so. It is currently home to the largest technology incubator hub in Europe, hosts the world-leading Edinburgh Parallel Computing Centre as well as data-driven hubs serving research innovation across the Health and Social Care, Public Sector, Financial Services, Fintech, Tourism and Festivals, Creative Tech, Agritech, Robotics and Autonomous Stems, Space and Satellite and Digital Tech sectors. It is predicted that as this sector grows substantially over the coming years, as many as 70,000 new jobs will be created.

The ambition is that all citizens of the Edinburgh City Region no matter their age, gender, background or ability will be **data citizens**, i.e. aware of how their personal data is used, their legal rights and privacy implications.

Equally, all citizens will have opportunities to acquire the data skills required to be competent and capable **data workers** within their chosen career. Training opportunities will exist via multiple routes for citizens to learn skills to use data to critically diagnose, analyse, and predict trends and patterns, manipulate datasets and use data in a myriad of creative and communicative ways.

The need for **data professionals** who have the specialist skill set and knowledge to lead and steer organisations through a data-driven economy is key to its success. Ensuring that routes exist through each of



these three tiers for all citizens of the city region to take advantage of these opportunities is a critical part of the ambition for the DDI Skills Gateway.

## 2 Consultations with Stakeholders

The groundwork for all three tiers of expertise – data citizen, data worker and data professional - has to begin with the region's schools, making sure that young people of all ages have the opportunity to engage with and develop the skills and abilities to use data effectively.

A significant strand of the DDI Skills Gateway is the Data Education in Schools programme which aims to support all schools across the region to offer a data education curriculum to its young people. Over the eight-year programme, the aim is that all 121,000 young learners across the region will have the opportunity to excel in data education regardless of gender, location, or background.

The Edinburgh City Region comprises of six Councils; City of Edinburgh, East Lothian, Fife, Midlothian, Scottish Borders and West Lothian. This report offers a comprehensive outline of the existing educational technology infrastructure across those six regions and has been compiled from several sources. The focus of the report is on the aspects of the infrastructure landscape, which are pertinent to the Data Education in Schools programme.

The report has synthesised information from several sources, and although not exhaustive, sources have included consultation with:

- 180+ pupils across 20+ schools in the region.
- Digital Learning Teams in each of the six city region Councils
- Council IT and Business Services staff in city region Councils
- Data Education in Schools team, Moray House School of Education and Sport
- CALL Scotland, University of Edinburgh
- Personnel in Education Scotland and the Scottish Government
- Academic and professional staff from the University of Edinburgh
- Contractors from partner organisations and businesses
- Survey data from individual Councils
- Existing published data from regional and national sources

The aim of this report is not to highlight the strengths or expose the weaknesses of individual Councils or schools, but to assimilate the data gathered from a range of sources and stakeholders into a set of key findings and recommendations. These will support the development of a Data Education in Schools programme across the region over the next eight years.

### 3 Supporting Data Education in City Region Schools

High-quality data education in schools requires investment in technology in terms of software, access to datasets and specialist hardware. Such investments will benefit not only data education, but also STEM learning and the development of digital literacy across the curriculum which are both priorities of the Scottish Government.

The role of Data Education in Schools is to provide professional learning for teachers and data learning materials mapped to Curriculum for Excellence. Our professional learning is primarily focussed on the pedagogy of data education, although we will also provide some courses on specific technology skills for teachers as necessary. We also aim to provide a technology lending library for schools within the City Region, on the understanding that local authorities may wish to pilot the use of new technologies before investing further.

Technology should not be a barrier to a school which wishes to improve data education. It is possible to teach valuable concepts in “data unplugged” activities which do not use technology at all. However, to support all stages of learning within the data problem-solving cycle, all learners will need access to general-purpose computing equipment (i.e. spreadsheet software on tablets, laptop or desktop computers) and online datasets. As it can be difficult to comfortably work with larger data sets on a small screen without a keyboard and mouse, and because the analysis functionality available on tablet software can be limited, we recommend that schools provide laptop or desktop computers for larger data projects with upper primary or secondary learners. Secondary schools which offer computing and data science qualifications will require specialist software including programming language environments and commercial data visualisation packages.

### 4 Summary of Recommendations

The recommendations in full are included in section 2 of the report. The summary of findings across the seven areas considered are as follows:

#### 4.1 Supporting specific tools for Data Education

Learners need access to software and hardware for collecting, analysing and presenting data. We recommend that Data Education in Schools and the Councils provide schools with:

- A range of local and online software tools, including spreadsheets, point and click data analysis tools, commercial visualisation tools, and programming environments for data science
- Access to a wide range of data sets for learners and teachers
- Access to Specific hardware, such as sensors and robots

## 4.2 Supporting Technological Environment: Connectivity, Coverage and Capacity

Connectivity is an enabler of learning and teaching through digital tools. There are four recommendations for Councils and their support teams contained within the main report, covering the following:

- Ensuring robust connectivity
- Providing connectivity for learners', teachers' and visitors' own technology
- Designing safe connectivity models for microcontrollers, modules and platforms
- Addressing barriers to access through minimising multiple sign-ons

## 4.3 Supporting Technological Environment: Inclusion

Data Education must be inclusively available to all learners, paying particular attention to the following:

- Identifying solutions that combat the poverty-related access to technology
- Looking for innovative solutions to the poverty-related bandwidth gap
- Delivering accessible resources through a universal design for learning

## 4.4 Supporting Technological Environment: Support Staff

Having staff in place to provide support for digital learning is critical in empowering learners and teachers.

This includes:

- Maintaining productive dialogue between university, council, school and technical staff
- Reviewing Internet filter change procedures to ensure they are responsive to the needs of learners and teachers
- Horizon-scanning and professional learning about emerging trends within data education for Council Digital Learning Teams

## 4.5 Supporting Technological Environment: Software

Ensuring trouble-free access to local and cloud-based software that will support data and digital education is essential. This includes:

- Maintaining up-to-date browsers to access online environments for data education
- Identifying, sharing and opening access to cloud-based learning environments
- Accessing cloud-based storage within Glow, O365 or G-Suite, and University of Edinburgh
- Providing suitable coding platforms across primary and secondary stages
- Addressing technical barriers to learning in Data Education, Cyber Security etc

## 4.6 Supporting Technological Environment: Hardware

There is an increasing need for access to technology hardware for many aspects of learning, including data and digital education. This includes:

- Regular reviewing of whether hardware is fit for purpose by Councils
- Providing loan-bank access to data education specific hardware by Data Education in Schools
- Addressing one-to-one deployment within individual schools to address any identified gaps in functionality
- Sharing of good practice about maker spaces between University and local authority partners
- Assisting with innovative IOT solutions by University of Edinburgh's Data Technology Service

## 4.7 Future Research and evidence gathering

The City Region partnership should, wherever feasible, contribute towards research and knowledge sharing. In particular, and if resources allow, the research should include:

- Professional dialogue around pedagogy and management of mobile technology in the classroom
- The use of data and digital and its impact on learning and teaching

## 5 Conclusions

The schools in the Edinburgh City Region will require some adjustments to their digital profile to take full value from the Data Education in Schools programme. These adjustments are achievable in all Education Authorities with the support of key personnel and the provision of a technology lending library of resources.

Critical to the success of the programme in schools will be the close working between the Data Education in Schools team, the Digital Learning Teams and their respective Technical Support Teams. Close working will maximise the likelihood that the digital tools that are available for learning and teaching are appropriate to support the programme.

The University of Edinburgh, through its IOT in Schools programme, will also contribute significantly to the development of Data Education in Schools, giving pupils access to a range of front-edge sensor technology, communication and data processing platforms.